L Number	Hits	Search Text	DB	Time stamp
1	1	("5155336").PN.	USPAT;	2002/06/08 09:53
			US-PGPUB	
2	4	(("4818327") or ("5155337") or ("5418885")	USPAT;	2002/06/08 09:56
-		or ("5444815")).PN.	US-PGPUB	
3	24	selectively with control with temperature	USPAT;	2002/06/08 10:06
		same wafer	US-PGPUB	i
4	1	("0454814").PN.	USPAT;	2002/06/08 10:05
1	_	(0000000 , 000000	US-PGPUB	;

DOCUMENT-IDENTIFIER: US 5436172 A TITLE: Real-time multi-zone semiconductor wafer temperature and process uniformity control system ----- KWIC -----ABPL: A real-time multi-zone semiconductor wafer temperature and process uniformity control system for use in association with a semiconductor wafer fabrication reactor comprises a multi-zone illuminator (130), a multi-point temperature sensor (132), and process control circuitry (150). method and system of the invention significantly improved wafer (60) temperature control and process

uniformity. The multi-zone illuminator module (130) selectively and

controllably heats segments of the semiconductor <u>wafer</u> (60). Multi-point

temperature sensor (132) independently performs pyrometry-based temperature

measurements of predetermined points of the semiconductor wafer (60). Process

control circuitry (150) operates in association with the multi-zone illuminator

(130) and the multi-point $\underline{\text{temperature}}$ sensor (132) for receiving the

temperature measurements and selectively controlling the
illuminator module to

maintain uniformity in the **temperature** measurements. A scatter module (116)

also provides input to process control circuitry (150) for real-time emissivity

compensation of the pyrometry-based temperature measurements of semiconductor

wafer (60).

BSPR:

According to one aspect of the invention, the system comprises in association a multi-zone illuminator, a multi-point temperature sensor,

and process control circuitry. The multi-zone illuminator module selectively and controllably heats segments of the semiconductor wafer. The multi-point temperature sensor independently performs pyrometry-based temperature measurements of predetermined points of the semiconductor wafer. Process control circuitry operates in association with the multi-zone illuminator and the multi-point temperature sensor for receiving the temperature measurements and selectively controlling the illuminator module to maintain uniformity in the temperature measurements. A scatter module also provides input to process control

circuitry for real-time emissivity compensation of the

06/08/2002, EAST Version: 1.03.0002

DOCUMENT-IDENTIFIER: US 5846375 A

TITLE: Area specific temperature control for electrode

plates and chucks used

in semiconductor processing equipment

----- KWIC -----

ABPL:

A temperature control system to selectively control the temperature of specific

areas of the chuck or electrode plate upon which a wafer is mounted during

plasma etching, chemical vapor deposition and other such temperature dependent

processes for the purpose of ultimately controlling the temperature of the

semiconductor wafer. The temperature control system includes a plurality of

conduits arranged about the center of the chuck as a series of concentric

radially adjacent loops. Each conduit is connected to its own inlet and outlet

to allow a heating or cooling agent to flow independently through each conduit.

BSPR:

Accordingly, it is desirable to have a chuck or electrode plate **temperature**

control system that is capable of providing a desired
temperature profile or

gradient across the **wafer by selectively** heating or cooling specific areas of

the **wafer**. One system proposed for achieving either a uniform or non-uniform

temperature gradient/profile across a CVD platen is disclosed in Carman et al.,

U.S. Pat. No. 5,294,778 issued Mar. 15, 1994 and entitled CVD Platen Heater

System Utilizing Concentric Electric Heating Elements. The Carman patent

describes a multiple coil electrical resistance heater system buried in a CVD

platen. The system consists of three elements--a spiral shaped main heating

06/08/2002, EAST Version: 1.03.0002

coil and inner and outer single heating loops. Electrical power to each of the individual resistance heaters can be varied to provide a uniform flat temperature profile or a smooth temperature gradient across the platen. The resistance heating system of Carman, of course, cannot provide the cooling required in semiconductor fabrication processes such as plasma etching to preserve the integrity of the photoresist. In addition, the use of a spiral coil as the main heating element limits the extent to which area specific heating can be achieved.